

# THE MELKBOS SITE: AN UPPER PLEISTOCENE FOSSIL OCCURRENCE IN THE SOUTH-WESTERN CAPE PROVINCE

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(With plates 8–10 and 3 figures)

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## INTRODUCTION

In the collections of the South African Museum (Natural History), Cape Town, is an assemblage of fossils recovered from a site near the coast north of the town of Melkbosstrand (fig. 1). The first recorded discovery of fossils at this locality was made in 1956 by Mr. J. Rudner of Cape Town. Thereafter small collections were made from time to time, and much of the material recovered found its way to the Anatomy Department of the University of Cape Town. In 1962 this material was presented to the South African Museum and forms the nucleus of the assemblage presently to be described.

The limits of 'the Melkbos site', as it has become known, are not clearly defined, fossil and cultural material having been recovered from an area about  $1\frac{1}{2}$  miles long and a few hundred yards wide, beginning about 3 miles north of the mouth of the Sout (Klein Sout) River. The fossils have been exposed by erosion in, and associated with, an horizon of calcareous sandstone ('calcrete') and sand in the area, which forms part of the Sandveld region (Talbot, 1947) (pl. 8A).

Pleistocene fossil occurrences are known from several localities along the Table Bay and False Bay coasts. These include Milnerton and Ysterplaats (Broom, 1909; Cooke, 1955), Paarden Eiland, Strandfontein and Swartklip (Singer & Fuller, 1962; Hendey & Hendey, 1968). The Melkbos site has been one of the most productive of these occurrences, and the South African Museum's collection at present includes over 600 specimens from the site. However, its true wealth can never be accurately assessed, since it is easily accessible and

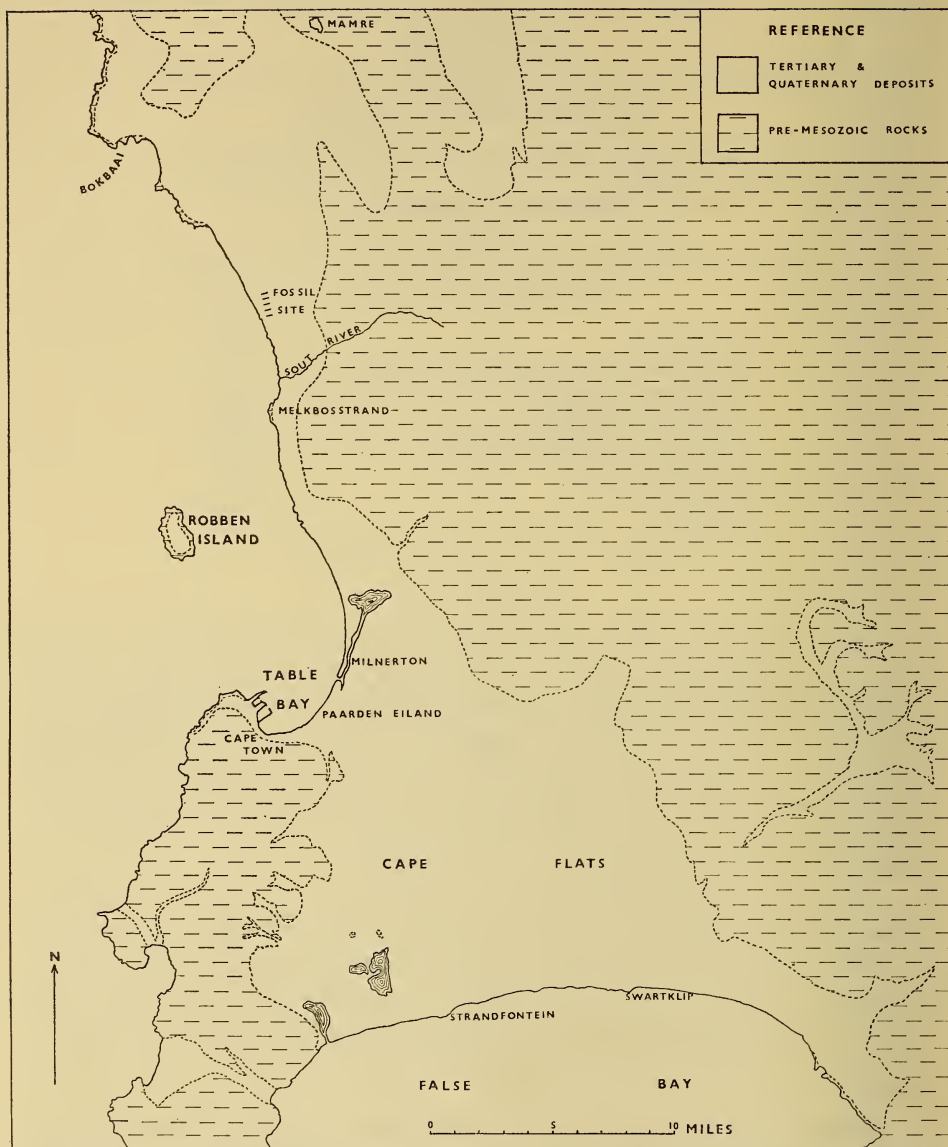


Fig. 1. The location of the Melkbos fossil site.

extensive collecting by visitors to the area takes place. In addition, the fossils are rapidly destroyed by weathering once they have been exposed.

The purpose of this report is to place on record the presence of the site, its relationship to other south-western Cape fossil sites and to give a preliminary account of the more important specimens thus far recovered.

#### GEOLOGICAL ASSOCIATIONS AND NATURE OF THE OCCURRENCE

The deposits in the area can conveniently be divided into two categories.

Firstly, there are Recent aeolian sands, which have resulted from the weathering and erosion of pre-existing deposits. These are, in places, vegetated and fairly stable, but elsewhere are in the form of mobile barchan dunes. Where they have been stabilized they are sometimes found in association with Late Stone Age middens. They are discontinuously developed and clearly post-date the period of fossil accumulation.

The second category of deposits are the Pleistocene sands, calcrete and ferricrete, with which the fossils are associated. They have a long and complex history, the sands probably having been laid down during the Tertiary, and been transported and redeposited several times since. No systematic excavations have been undertaken in the area, and the sequence of events suggested below is based only on surface observations.

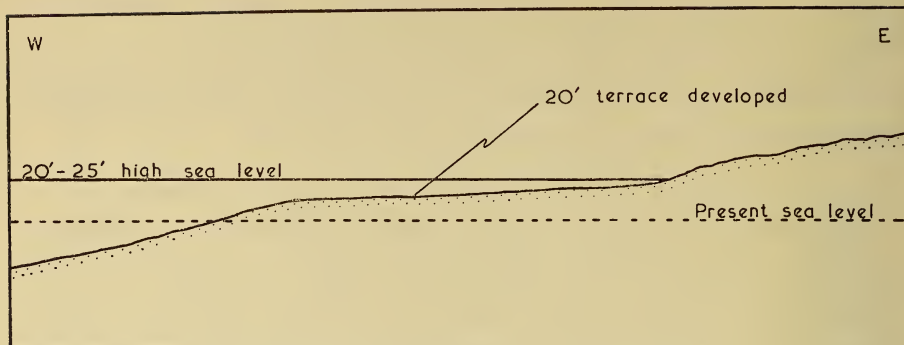
In the area between the fossil occurrence and the sea, a fairly extensive platform is exposed, almost certainly 'wavecut', with an elevation of about 20 feet above sea-level. Krige (1927) refers this platform to his 'Minor Emergence', stating that 'the overgrown flats at Melkbosch Strand suggests a terrace of the right order'. Assuming correspondence to the European Pleistocene sea-level changes, and in the present instance there is no reason to believe that such a correlation is invalid, this terrace is Late Monastirian (= Tyrrhenian III) in age (Zeuner, 1959; Oakley, 1964).

The fossiliferous deposits at Melkbos overlie the 20-foot terrace, and therefore post-date it (fig. 2).

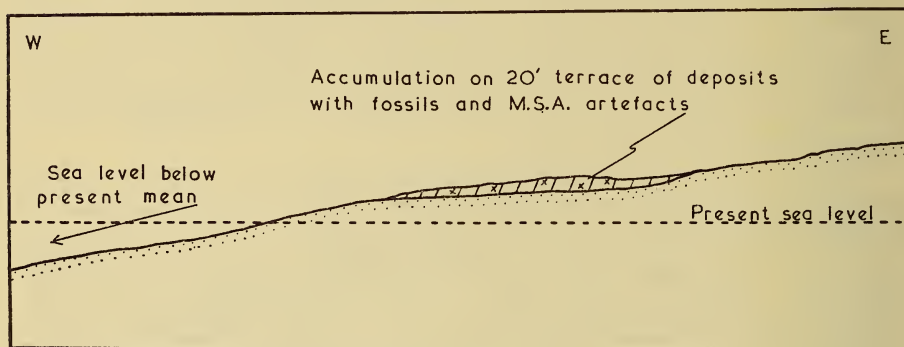
Mabbutt *et al.* (1955) recorded a succession at Bok Baai (fig. 1) which includes a calcrete, almost certainly equivalent to that at Melkbos, overlying 'Minor Emergence' beaches and related cliff slopes.

The Early Würm interstadial, with which the Late Monastirian is correlated (Oakley, 1964), has been assigned a chronometric date of about 40,000 years B.P. (Emiliani, 1961). The Chatelperronian industry of the Upper Palaeolithic of Europe has been related, in time, to this interstadial and the industry has been dated to about 32,000 B.C. at Arcy sur Cure, France (Oakley, 1964). The South African Middle Stone Age/Second Intermediate industries, with which the Melkbos fauna has suggested associations (*vide infra*), has been dated variously between 44,000 B.P. to 2540 B.C., with 'the Middle Stone Age *in sensu [sic] stricto* . . . later than 40,000 years B.P.' (Deacon, 1966).

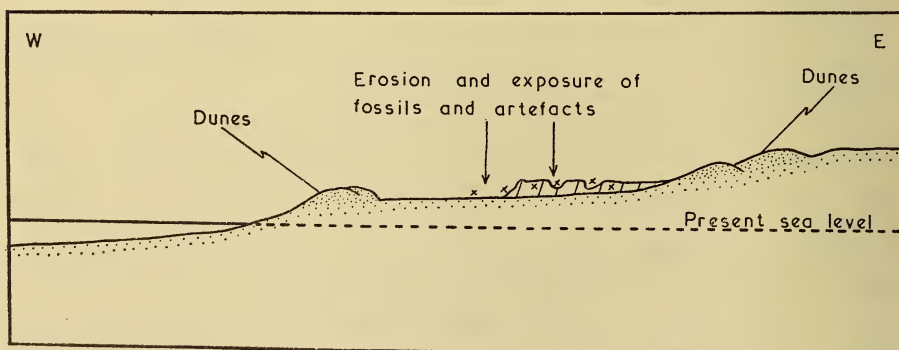
The Melkbos fauna is therefore considered to be no earlier than 30,000 to 40,000 years B.P. No upper age limit was determined, but a date of late Upper



1. Earlier part of UPPER PLEISTOCENE



2. Latter part of UPPER PLEISTOCENE



3. RECENT

Fig. 2. Diagrammatic representation of the suggested sequence of events at the Melkbos site.



Pleistocene is proposed for the fauna. This will serve adequately to place it chronologically, until such time as a more definite chronometric date is established.

It was not evident from the surface observations whether single or multiple fossiliferous horizons exist. The fossils appeared to be preserved only in association with the calcrete, i.e. the original lime-rich horizon of the Upper Pleistocene palaeosol. A few very poorly preserved specimens were found in the more acid horizons of the palaeosol, which are now marked by the exposures of ferricrete.

Gradual concentration of the calcium carbonate in the lime-rich horizon, and induration following its exposure, has given rise to the calcrete in its present form. The outer surfaces of the exposures are extremely hard, but the degree of induration diminishes away from the exposed areas (cf. Du Toit, 1917: 12). The calcrete is, therefore, not strictly speaking Pleistocene in age since some of its characters are still being developed, but it had its beginnings at the time of the development of the soil body overlying the 20-foot terrace and after the fossils were already in place.

The site is exposed to both south-easterly and north-westerly gales which are prevalent in the region in summer and winter respectively, and wind erosion of the area is perennial and severe. The exposed fossils suffer extensive sand-blasting, and develop a deep red or dark brown colour and a very characteristic glazed patination, reminiscent of the 'desert varnish' of rocks in arid regions. Bone fragments litter the site, but diagnostic material is much less common (pl. 8B).

#### ARCHAEOLOGICAL ASSOCIATIONS OF THE FOSSILS

No positive association between cultural material of a known period and the fossils has been demonstrated.

The fossils predate the Late Stone Age middens which often occur on or within the Recent aeolian sands. They have been found in surface association with undoubted L.S.A. artefacts, but this is considered to be fortuitous.

No Early Stone Age material has been recorded from the site.

Undiagnostic silcrete flakes have on occasion been found during the excavation of fossils in the unconsolidated deposits, and on rare occasions there have been 'flakes' of dubious authenticity found embedded in the calcrete. The former, at least, were considered to be genuine archaeological associations. Several finely worked bifacial points of a rather small size, and flakes with prepared striking platforms, all in a silcrete similar to that of the excavated material have been recovered from the surface of the site. This lithic material, undoubtedly dates from the Middle Stone Age or Second Intermediate, and an association between it and the fossils is suggested.

#### THE FAUNAL ASSEMBLAGE

The nomenclature, with a few exceptions, follows that of Ellerman *et al.* (1953).

Class **MAMMALIA**Order **CARNIVORA**Family **Hyaenidae***Hyaena* cf. *brunnea*Family **Felidae***Felis leo* aff. *spelaea*Family **Canidae***Canis* cf. *mesomelas*Order **PINNIPEDIA**Family **Otariidae**? *Arctocephalus pusillus*Order **PROBOSCIDEA**Family **Elephantidae**? *Loxodonta africana*Order **PERISSODACTYLA**Family **Rhinocerotidae***Diceros simus**Diceros bicornis*Family **Equidae***Equus* sp.Order **ARTIODACTYLA**Family **Hippopotamidae***Hippopotamus amphibius*Family **Bovidae***Syncerus* sp.*Tragelaphus* cf. *strepsiceros**Taurotragus oryx**Redunca arundinum*cf. *Hippotragus* sp.*Connochaetes* sp.*Raphicerus* sp.cf. *Antidorcas* sp.Order **RODENTIA**Family **Bathyergidae***Bathyergus suillus*Class **REPTILIA**Order **CHELONIA***Incertae sedis*Class **AVES**Order **STRUTHIONIFORMES**Family **Struthionidae***Struthio australis*

## SYSTEMATIC DESCRIPTION OF THE FAUNA

Class *MAMMALIA*Family *Hyaenidae**Hyaena* cf. *brunnea* Thunberg

## Brown Hyaena

The only hyaenid remains recorded from the site are an incomplete mandible (Mb 116) and an incomplete maxilla (Mb 117), which belong almost certainly to the same adult individual (pl. 9). Both specimens are from the left side. *Mb 116*—(table 1)—The mandible has lost that part of the corpus posterior to the  $P_4$ , and has suffered extensive post-fossilization weathering. The  $I_3$  root, incomplete  $\bar{C}$ ,  $P_2$  and  $P_4$ , and the almost intact  $P_3$  are preserved. It exhibits characteristics of the genus *Hyaena* as defined by Ewer (1954), although it differs slightly from the *H. brunnea* mandibles of the comparative series.

TABLE 1

DIMENSIONS OF MELKBOS *HYAENA* CF. *BRUNNEA* TEETH AND MANDIBLE, COMPARED WITH THOSE OF A FOSSIL SPECIMEN FROM ELANDSFONTEIN AND TWO SERIES OF MODERN SPECIMENS.

	Mb 116	E'f'tein 16686	Modern <i>H. brunnea</i> †		Modern <i>H. brunnea</i> *	
			Mean	Range	Mean	S.D.
C { 1 ... ..	19.6	19.5	18.3	17.5–19.8	17.16	1.14
{ b ... ..	12.6	13.5	12.9	12.0–13.4	13.35	0.84
$P_2$ { alveolar l ... ..	16.7	17.3	14.7	13.4–15.3	—	—
{ alveolar b ... ..	8.0	9.5	7.8	6.7–8.4	—	—
$P_3$ { 1 ... ..	21.0	22.2	20.9	20.3–21.5	21.17	0.40
{ b ... ..	c15.0	15.0	14.4	13.6–15.0	14.40	0.60
$P_4$ { 1 ... ..	c23.7	24.7	22.7	22.4–22.9	23.59	0.56
{ b ... ..	c13.7	14.2	13.4	12.9–13.7	13.80	0.51
$P_2$ – $P_4$ alveolar l ... ..	c60.0	61.6	56.8	56.6–57.0	—	—
Diastema length ... ..	8.7	8.2	11.8	10.8–13.1	—	—
Corpus height below $P_3$ ...	40.0	41.0	36.3	34.1–38.5	—	—
Corpus width below $P_3$ ...	21.0	24.1‡	18.7	17.4–19.5	—	—
Distance between $LP_3$ and $RP_3$ ... ..	c58.0	c62.0	57.5	55.0–59.1	—	—

† Sample of four specimens.

\* Ewer & Singer, 1956; sample of thirteen specimens.

‡ Measurement somewhat high due to a pathological condition in this region of the mandible.

The diastema is appreciably shorter and the  $P_2$  and  $P_4$  slightly longer than those of the comparative specimens. However, the  $P_4$  length corresponds closely to the mean of a series of 13 measurements given by Ewer and Singer (1956) for *H. brunnea*.

The corpus is very robust, and falls beyond the size range of the comparative series. The estimated inter-corporal width falls within the range observed in *H. brunnea*.

*Mb 117*—(table 2)—The maxilla has only the damaged crown of the  $P^3$  preserved, while little more than the roots of the  $P^2$  and  $P^4$  remain. It shows greater

differences from the *H. brunnea* comparative series than does the mandible, although it clearly belongs to *Hyaena* rather than *Crocuta*.

TABLE 2

DIMENSIONS OF MELKBOS *HYAENA* cf. *BRUNNEA* UPPER TEETH, COMPARED WITH THOSE OF A SERIES OF FOUR MODERN SPECIMENS.

						Mb 117	Modern <i>Hyaena brunnea</i>	
							Mean	Range
P <sup>1</sup> -P <sup>4</sup> alveolar length		...	...	...	...	80.0	77.2	75.9-78.5
P <sub>2</sub>	{	alveolar l	...	...	...	17.5	15.5	15.1-15.7
		alveolar b	...	...	...	9.0	8.3	7.8- 8.8
P <sub>3</sub>	{	l	...	...	...	22.9	23.2	22.6-23.8
		bm	...	...	...	c14.4	14.7	13.0-15.5
		bd	...	...	...	15.5	15.8	15.0-16.9
P <sub>4</sub>	{	alveolar l	...	...	...	33.0	32.8	30.0-34.2
		alveolar b	...	...	...	18.6	19.3	18.0-20.5

The length of the anterior alveolus of the P<sup>4</sup> expressed as a percentage of the total alveolar length of this tooth, is 39.4, as against a mean of 43.6 for the *H. brunnea* series and 29.4 for the *C. crocuta* series.

The alveolus of the P<sup>1</sup> is small, almost circular in shape and overlaps the distal end of the C alveolus on its lingual side. The position of the P<sup>1</sup> relative to the C of the comparative specimens was variable, but none exhibited an overlapping of these teeth. With the C set back so far relatively, the canine fossa is very pronounced, and descends steeply from the infra-orbital foramen to the alveolar margin. These features, taken in conjunction with the relatively short mandibular diastema indicate an overall foreshortening of the anterior region of the snout. The lengths of the cheek tooth rows are greater than those of the comparative specimens, indicating that the foreshortening is confined to the canine/incisor region.

The P<sup>2</sup> is both longer and broader than those of the comparative series, while the P<sup>3</sup> falls within the size range of variation. The latter differs from the P<sup>3</sup> of the comparative series in that an anterior accessory cusp is present in the form of a small but clearly defined projection from the cingulum.

#### Discussion

Owing to the condition of the fossil specimens, the fact that they represent only a single individual, and in view of the limited number of comparative specimens, there are insufficient grounds for separating the Melkbos *Hyaena* specifically or subspecifically from the extant *H. brunnea*.

The possibility that it is not an isolated aberrant specimen is lent some support by a recently discovered *Hyaena* mandible and P<sup>3</sup> (16686 and 16687) from the Elandsfontein (Hopefield) site. These specimens exhibit some of the



unusual features observed in Mb 116 and Mb 117. *H. brunnea* has already been recorded from the Elandsfontein site (Ewer & Singer, 1956), but the new specimens differ from those previously described in much the same way as those from Melkbos differed from the comparative series. The mandibular corpus of 16686 is extremely robust and corresponds closely in size to that of Mb 116. The diastema is slightly shorter than that of Mb 116 (table 1). The P<sup>3</sup> (16687) has a small anterior accessory cusp identical in development to that of Mb 117. The teeth of the Elandsfontein and Melkbos specimens are similar in size.

### Family **Felidae**

#### *Felis leo* aff. *spelaea* Goldfuss

The lion is represented in the assemblage by four specimens, which belong to at least two individuals. Postcranial remains include the distal half of a right radius (Mb 561) and the proximal half of a left fourth metacarpal (Mb 576). Cranial remains include a fragment of a right mandible (Mb 603) and an incomplete left mandible (Mb 143).

*Mb 143*—(pl. 10; table 3)—This is the right mandible of an adult individual which lacks the ascending ramus, the angular process and those parts of the corpus anterior to the P<sub>4</sub>. The P<sub>4</sub> and M<sub>1</sub> are largely intact and well preserved.

The P<sub>4</sub> has lost the most mesial portion of the anterior cusp. In spite of this, its estimated length was significantly greater than the length of corresponding teeth in a series of 17 modern lion specimens. The breadth falls within the range observed in this series, although it is greater than the mean.

The M<sub>1</sub> shows slight wear on the shearing blades. Its length is slightly above the maximum of the comparative series, and the estimated breadth is near the upper limit of the observed range.

Morphologically the teeth are indistinguishable from those of the modern lion, although the 'talonid' of the M<sub>1</sub> is slightly more pronounced in the fossil specimen.

On discovery the specimen was embedded in a block of calcrete with only the lingual surface of the corpus and the M<sub>1</sub> exposed. This area has been heavily weathered, and the mandibular canal and anterior root of the M<sub>1</sub> have been exposed. The vertical wall of the masseteric fossa and inferior margin of the corpus posterior to the M<sub>1</sub> have been lost.

The corpus is extremely robust, but differs most notably from those of the comparative specimens in the region of the masseteric fossa. The superior and anterior walls of the fossa are steep, while the inferior wall becomes progressively more U-shaped posteriorly, with the development of a ridge of bone along the buccal surface of the inferior margin. On a line 20 mm behind the posterior end of the M<sub>1</sub>, the height measured from the top of this ridge to the inferior margin of the mandible is +26.0 mm. The mean for corresponding measurements in 10 comparative specimens was 18.4 mm, with a maximum of only 22.0 mm. Towards the posterior limit of this ridge and immediately below

TABLE 3  
 DIMENSIONS OF MELKBOS *FELIS LEO* TEETH AND MANDIBLE, COMPARED WITH THOSE OF A SERIES OF 17  
 MODERN SPECIMENS, AND A SERIES OF *FELIS LEO SPELAEA* TEETH FROM BRITAIN.

	Melkbos			Modern African <i>Felis leo</i>			Pleistocene <i>F. leo spelaea</i> *				
	Mb 143	Mb 603		Mean	Range	S.D.	Mean	Range	No. measured		
P <sub>4</sub> } bm bd	..	..	..	c32.0	+25.0	26.85	23.1-29.5	2.07	30.13	22.9-33.0	9
	..	..	..	11.9	+11.0	10.60	8.7-12.2	0.89	—	—	—
	..	..	..	14.9	+13.0	13.54	10.8-15.5	1.32	13.74	10.4-16.3	9
M <sub>1</sub> } b	..	..	..	31.0	—	28.12	25.7-30.6	1.35	30.33	26.2-33.0	7
	..	..	..	c16.0	—	14.18	12.2-16.2	1.19	14.12	10.2-15.2	6
Corpus height below P <sub>4</sub>	..	..	..	52.8	—	45.46	32.8-52.8	5.86	—	—	—
Corpus height below M <sub>1</sub>	..	..	..	53.7	—	45.64	34.4-54.5	5.92	—	—	—

\*Dawkins & Sanford (1866-1872); measurements of both 'large' and 'small' forms.

it, there arises a horizontally projecting ridge which curves downwards in the direction of the missing angular process. Although there was considerable variation in the nature of this region of the mandible in the comparative specimens, none showed the pronounced development of the features observed in Mb 143. This suggests that the masseter muscle was very powerfully developed, a factor which is in keeping with the relatively large size of the specimen.

*Mb 603*—(table 3)—This poorly preserved specimen, a fragment of a right mandible, retains only a damaged  $P_4$ . Although accurate measurements of this tooth are not possible, it appears to be larger than the mean of the comparative series.

*Mb 561*—(table 4)—This specimen, the distal portion of a right radius, is poorly preserved and has lost the styloid process and much of the brachioradialis tuberosity. Morphologically it is indistinguishable from the radius of the modern lion, but was significantly larger than the three comparative specimens available. It corresponds closely in size to a series of four felid radii from the Elandsfontein site, which are thought to belong to a large extinct lion (*vide infra*).

TABLE 4

DIMENSIONS OF MELKBOS *FELIS LEO* RADIUS, COMPARED WITH THOSE OF A SERIES OF THREE MODERN LIONS, AND A SERIES OF FOUR FOSSIL SPECIMENS FROM ELANDSFONTEIN.

	Mb 561	Elandsfontein		Modern <i>F. leo</i>	
		Mean	Range	Mean	Range
Transverse diameter*	40.0	41.0	37.0–44.0	31.5	28.4–34.0
A/P diameter* ...	23.5	22.3	20.5–23.0	22.7	21.8–23.8

\* Measured immediately above brachioradialis tuberosity.

*Mb 576*—A metacarpal fragment, which although heavily weathered, clearly belonged to a lion of substantial proportions.

### Discussion

The Melkbos lion, while being of robust proportions, cannot on available evidence be separated specifically from the extant *F. leo*. The few previously described fossil lions from South Africa (Broom, 1939 & 1948; Ewer, 1956*a*) are known only from fragmentary remains, and their specific rank is open to some doubt. In respect to size and the development of the  $M_1$  'talonid', the Melkbos lion is similar to the '*Panthera shawi*' from Kromdraai (Ewer, 1956*a*), but the remains of both forms are too scanty to allow conclusive comparisons.

It is probable that a close relationship exists between the Melkbos lion and the as yet undescribed form from Elandsfontein, which is appreciably larger than the extant form.

The relatively abundant lion remains from Swartklip (Hendey & Hendey, 1968) represent a form indistinguishable from the extant *F. leo*, and it is probably at least subspecifically distinct from that from Melkbos. Possible relationships

of both these forms to the recently extinct Cape Lion (*Felis leo melanochaitus* Smith) were considered, but owing to the lack of information on the osteology of the latter, the question remained inconclusive.

The relatively large size of the Melkbos lion invites speculation on its possible relationship to the 'giant' felines of the Pleistocene of the Northern Hemisphere. These include the giant 'jaguar' of North America (*Felis atrox*) (Merriam & Stock, 1932; Simpson, 1941; Kurtén, 1965a), the 'tigers' of the Asian Pleistocene (*F. tigris* subspp.) (Hooijer, 1947) and the European cave lion (*F. leo spelaea*) (Dawkins & Sanford, 1866-72). It is with the latter that the Melkbos lion is tentatively identified, although the basis for comparison is limited by the fragmentary remains from Melkbos. Both the size and character of the teeth, and the overall size of the animals suggest a close relationship between the two forms (fig. 3, table 3).

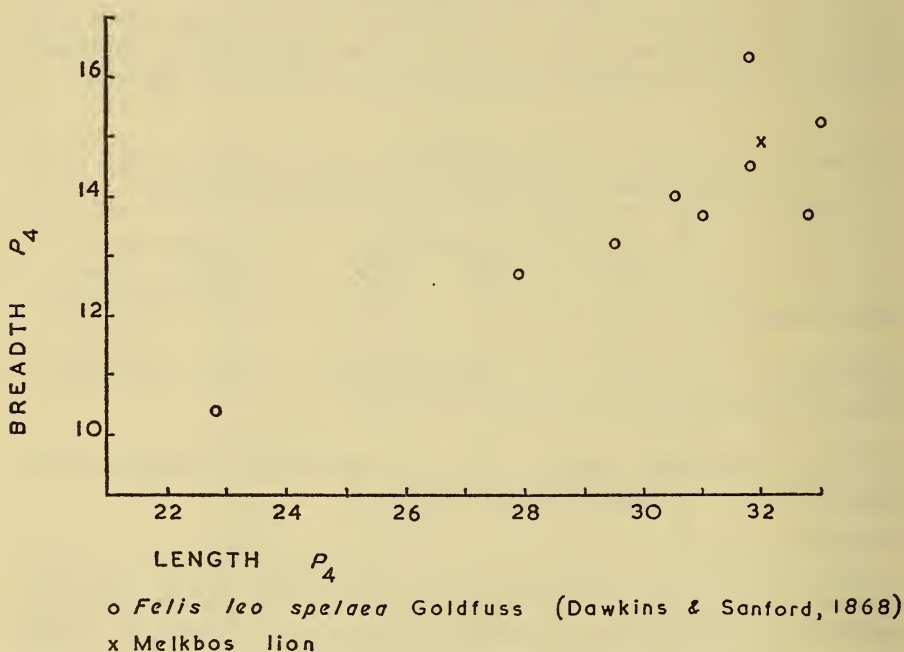


Fig. 3. The length/breadth relationship of the P<sub>4</sub> of the Melkbos lion, compared with those of a series of *Felis leo spelaea* specimens from Britain.

The great distance between Melkbos and the known limit of distribution of *F. leo spelaea* makes it necessary to express reservations on the identification. The question can clearly not be resolved until such time as a greater number of more complete specimens are known from South Africa. However, even the extant subspecies of large felines are not easily distinguished on osteological grounds alone. This is true of the African and Indian lions (Todd, 1966) and the tigers of south-east Asia (Hooijer, 1947). In the case of the latter there is a



marked decrease in size towards the periphery of the area of distribution. This is a parallel of the situation observed in many carnivores during the Pleistocene, where a marked decrease in size occurred with the passage of time (Kurtén, 1965*b*). The variations in the size of carnivores in both time and geography obviously limit the use of this factor alone as a taxonomic discriminant.

### Family **Canidae**

*Canis* cf. *mesomelas* Schreber

#### Black-backed Jackal

The jackal is represented in the assemblage by a single  $M_1$  (MB 556), which is well preserved and in a moderately advanced state of wear. Morphologically this tooth is not distinguishable from the corresponding teeth of the two extant South African jackals, *C. mesomelas* and *C. adustus*. However, metrically it corresponds more closely to the former, being only slightly larger than the maximum of a range given for this species by Ewer (1956*b*) (table 5).

TABLE 5

DIMENSIONS OF THE  $M_1$  OF *CANIS* CF. *MESOMELAS* FROM MELKBOS, COMPARED WITH A SAMPLE OF TEN *C. ADUSTUS* AND FOURTEEN *C. MESOMELAS* SPECIMENS (EWER, 1956*b*).

	Mb 556	<i>C. adustus</i>		<i>C. mesomelas</i>	
		Range	Mean	Range	Mean
$M_1 \begin{cases} 1 & \dots & \dots & \dots & \dots \\ b & \dots & \dots & \dots & \dots \end{cases}$	21.0	17.4-15.0	16.2	20.7-16.5	18.8
	9.7	6.8- 5.1	6.1	8.2- 6.5	7.2

In a study of the *C. mesomelas* remains from the Elandsfontein site, Ewer and Singer (1956) found that several of the fossil teeth exceeded the known size range of the modern species.

Since then newly discovered material from the Elandsfontein and Swartklip sites has suggested the presence of a jackal in the south-western Cape during the Pleistocene of somewhat greater proportions than the extant *C. mesomelas*.

It may prove that the Melkbos specimen has affinities with this extinct form, but at present there is no adequate reason for separating it from the species *mesomelas*.

### Family **Otariidae**

? *Arctocephalus pusillus* Schreber

#### Cape Fur Seal

A single fragment of the distal end of a humerus (Mb 546) is tentatively ascribed to this species. Only the medial epicondyle and part of the trochlea are preserved. It compares closely in size and morphology to the humeri of female *A. pusillus* specimens. The proximity of the site to the coast in an area where this seal occurs today, lends some support to its suggested affinities.

Family **Elephantidae***?Loxodonta africana* Blumenbach

## African Elephant

Three fragments of a cheek tooth (Mb 513 A & B, and Mb 514) are the only elephant cranial remains recorded from the site. Their condition precludes positive diagnosis, but there is no reason to believe that they belong to a form other than *L. africana*.

Two fragments of a right scapula (Mb 78 & Mb 515), belonging almost certainly to the same bone, compare closely in all observable respects to the corresponding parts of scapulae of *L. africana*.

In view of the fragmentary nature of these remains, they are only tentatively ascribed to *L. africana*.

The recently described lower molar of '*Archidiskodon*' cf. *transvaalensis* (Hendey, 1967), recovered near the mouth of the Klein Sout River, has no apparent associations with the main Melkbos fossil site.

Family **Rhinocerotidae***Diceros simus* Burchell

## White Rhinoceros

The White Rhinoceros was identified in the assemblage from a series of upper teeth of a single immature individual.

*Mb 511A*—(table 6)—LM<sup>2</sup>, lacking the roots and in which the protoloph and metaloph have been reconstructed. The crochet is slightly worn, but the crista is still below the grinding surface. All the outer cement covering has been lost, but some remains in the medi- and postfossettes.

TABLE 6

DIMENSIONS OF *DICEROS SIMUS* TEETH FROM MELKBOS, COMPARED WITH THOSE OF TWO MODERN SPECIMENS.

					Mb 511A	Mb 511B	Modern <i>D. simus</i>	
							21379	21381
M <sub>2</sub>	1	...	...	...	66·1	—	69·0	71·4
	b	...	...	...	c45·0	—	41·0	45·5
M <sub>1</sub>	1	...	...	...	—	c67·0	69·6	61·5
	b	...	...	...	—	c42·5	44·5	43·5

*Mb 511B*—(table 6)—LM<sup>1</sup>, lacking the roots and outer cement covering, and in which the ectoloph, protoloph and distal portion of the metaloph have been reconstructed. The medifossette is separated from the prefossette by the uniting of the crista and crochet.

*Mb 511C*—LP<sup>4</sup>, very poorly preserved, and either completely unworn or in a very early stage of wear.

*Mb 511D*—LP<sup>3</sup>, and least well preserved of the teeth.

In size and morphology this series of teeth corresponds closely to those of two modern *D. simus* specimens, and the degree of wear indicates an order of eruption normally found in the rhinoceros, i.e.  $M^1$ ,  $M^2$ ,  $P^3$ ,  $P^4$  (Cooke, 1950).

A skull fragment (Mb 591) was also tentatively assigned to *D. simus*.

### *Diceros bicornis* Linnaeus

#### Black Rhinoceros

This species is represented in the assemblage by an incomplete mandible (Mb 125). It consists of a large part of the right corpus and the symphyseal region. The right  $P_3$  and  $P_4$  are largely intact, and the  $RM_1$  is partially preserved. Only the roots of the other right molars, and the  $LP_1$  and  $LP_2$  remain. The symphyseal region is of the characteristic *D. bicornis* type and in size (table 7) and morphology the teeth are indistinguishable from those of the modern species.

TABLE 7

DIMENSIONS OF *DICEROS BICORNIS* TEETH FROM MELKBOS, COMPARED WITH THOSE OF A SERIES OF FIVE MODERN SPECIMENS.

	Mb 125	Modern <i>D. bicornis</i>	
		Mean	Range
$P_2$ - $M_3$ alveolar length ... ..	285.0	272.0	253.0-297.0
$P_3$ { 1 ... ..	35.0	37.0	33.0- 39.1
	c31.0	31.9	30.8- 34.6
$P_4$ { 1 ... ..	42.5	44.6	41.9- 46.9
	c34.0	35.8	34.3- 38.0

#### *Diceros* sp.

Two tooth fragments (Mb 179 & Mb 583) and two mandible fragments (Mb 154 & Mb 427) were not identified as to species.

Rhinoceros postcranial remains are abundantly represented in the assemblage, but owing to the difficulty of distinguishing the two extant African species on the basis of their postcranial skeletons, no attempt was made to categorize these specimens specifically.

### Family Equidae

#### *Equus* sp.

Equid remains are rare at the site, and only three teeth and five elements of the postcranial skeleton have been recovered.

*Mb 120*—A left  $M^2$ , the best preserved of the teeth, which corresponds closely in size to the  $M^2$  of the *Equus helmei* type specimen (Dreyer & Lyle, 1931), but which does not exhibit the same complexity in the enamel pattern of the occlusal surface.

*Mb 121 & Mb 137*—Right upper and lower premolars, respectively, and both poorly preserved.

In view of the present unsatisfactory classification of South African fossil Equidae, and the number and condition of the Melkbos specimens, no specific diagnosis is proposed.

Family **Hippopotamidae**

*Hippopotamus amphibius* Linnaeus

The hippopotamus is represented in the assemblage by an incomplete  $M_3$ , of which only the hypoconid and entoconid are preserved.

Family **Bovidae**

Tribe *BOVINI*

*Syncerus* sp.

One of the most commonly represented bovids at the site is a large syncerine buffalo.

*Material*

*Mb 610*—An incomplete and highly fragmented skull, which consists of the base of the horn cores and frontal region, nasals and part of the left maxilla. Although observations on the skull characters were limited by the condition of the specimen, it proved to be considerably more robust than the *Syncerus caffer* comparative specimens (table 8).

The nasals correspond fairly closely in size to those of *Homoioceras* specimens from the Elandsfontein site. They are flattened rather than arched, and when articulated with the single remaining maxillary fragment it was apparent that in general appearance and proportions, the facial region of this specimen is similar to that of '*Homoioceras*'.

TABLE 8  
DIMENSIONS OF *SYNCERUS* SP. SKULL FROM MELKBOS, COMPARED WITH THOSE OF *SYNCERUS CAFFER* SPECIMENS.

		<i>Syncerus caffer</i> *			
		♂			♀
		Mean	Range	No. measured	
	Mb 610				35445
Maximum width across nasals ... ..	+86.0	63.8	54.5-72.0	6	c60.0
Maximum A/P width of horn core bosses ...	+247.0	220.7	207.0-230.0	3	156.0
Minimum distance be- tween left and right bosses ... ..	c25.0	29.7	27.0-34.0	3	c77.0
Maximum distance be- tween left and right bosses ... ..	c33.0	48.3	41.0-52.0	3	—

\* Specimens in collections of S.A. Museum (Nat. Hist.)



However, the morphology of the frontal region corresponds more closely to that of *Syncerus*. The roof of the skull above the frontal sinuses is heavily rugose, far more so than in *S. caffer*, but clearly quite unlike the condition in '*Homoioceras*', in which the bases of the horns are not bossed. The median 'valley' separating the bosses is narrower in the Melkbos specimen than in any of the *S. caffer* comparative specimens, which is a factor in keeping with the greater overall size of the former. The anterior edge of the horn cores above the orbits parallels the condition in *Syncerus* exactly, the only difference being in degree of development. The antero-posterior diameter of the horn cores could not be measured accurately, since their posterior margins have been lost, but the remaining part of the left boss apparently comes close to the posterior point of recurvature. It measures 247 mm, 17 mm more than the maximum of the *S. caffer* comparative series. The males of this series were all hunting trophies and almost certainly above average size for the species.

There were two features in which the horn cores differed from the comparative specimens. The bosses did not display the marked dorsal antero-posterior convexity present in *Syncerus*, and secondly, although little of the horn cores beyond the bosses remains, it is clear that they do not have a pronounced downward sweep of the horns beyond the bosses. Roberts (1951) states that, 'as we go northward in the continent the horns of Buffaloes dip downward less and less until . . . they are on the top of the skull with only an outward and upward trend'. Consequently, the sweep of the horns in Mb 610, although not typical of the southern African *S. caffer*, is apparently the normal condition in their northern relatives.

*Mb 15, and associated fragments Mb 89, 93 & 96*—The horn core fragments of a second individual, which parallel in all observable respects the features of Mb 610, indicating that the latter is not a single atypical specimen.

*Mb 608 & Mb 609*—(tables 9 & 10)—Right and left mandibles of a single individual, the former with a complete set of cheek teeth, and the latter with the  $M_1$ ,  $M_2$  and incomplete  $M_3$ . The corpora of both halves are incomplete.

TABLE 9

DIMENSIONS OF *SYNCERUS* SP. MANDIBULAR CORPORA FROM MELKBOS, COMPARED WITH THOSE OF A *SYNCERUS CAFFER* SPECIMEN.

	Mb 67	Mb 144*	Mb 608	M 147†
Maximum height below $M_3$	81.0	c75.0	89.0	67.6
Maximum width below $M_3$	43.2	c36.0	c47.0	30.7
Maximum height below $P_3$	64.4	—	—	57.2
Maximum width below $P_3$	32.5	—	—	23.4

\* Immature individual.

† Large ♂ *Syncerus caffer*.

*Mb 67*—(table 9)—The almost intact corpus of a right mandible lacking all the teeth.

*Mb 144*—(tables 9 & 10)—A left mandible, lacking that part of the corpus anterior to the  $M_1$ , but otherwise intact. The  $M_1$ ,  $M_2$  and  $M_3$  are well preserved but incompletely erupted.

*Mb 4*—(table 10)—An incomplete right mandible with the  $M_2$  and  $M_3$  preserved.

*Mb 220*—Incomplete left mandible with poorly preserved  $M_2$  and  $M_3$ .

*Mb 465*—(table 10)—An incomplete left mandible with  $P_3$ ,  $P_4$  and  $M_1$ , and associated  $M_2$  (*Mb 464A*) and  $M_3$  (*Mb 464B*).

In addition to the above material, ten isolated lower and four upper teeth belonging to this genus were recovered.

A large number of elements of the postcranial skeleton were also recovered, but they were not studied in detail.

Morphologically the lower teeth of the Melkbos buffalo are indistinguishable from those of the extant *S. caffer*.

The premolars were similar in size to those of the single comparative specimen available, but the molars were, in general, significantly larger (table 10). The mandibular corpora of the fossil specimens were considerably more robust than that of the single comparative specimen, which belongs to a large male. The greatest size difference was in the region posterior to the premolar series. None of the lower teeth approached those of '*Homoioceras*' in size, but the posterior parts of the corpora corresponded fairly closely to those of the smaller '*Homoioce-*  
*ras*' specimens from Elandsfontein.

#### Discussion

Published records of the fossil buffaloes of southern Africa are very limited, although a large amount of material is available for study. The Pleistocene longhorned forms from this region are now almost invariably referred to '*Homoioceras bainii*', in spite of the fact that the original description of this species ('*Bubalus*' *bainii* Seeley, 1891) is very inadequate, and the generic designation (Bate, 1949 & 1951) is based on inference rather than actual study of available material.

The relationship between the southern African '*Homoioceras*' and the extant *Syncerus* is not at all clear, and consequently speculations on the affinities of the Melkbos buffalo to these two forms are somewhat premature at this stage. There is, however, little doubt that the Melkbos material will be of great importance in any future consideration of the phylogeny of the African buffaloes. The admittedly inadequate comparisons with *S. caffer* and '*Homoioceras*' specimens made in the course of the present study, suggest that it is 'intermediate' between the two forms in many respects. A more detailed comparative study must inevitably be hampered by the limited amount and condition of the cranial material from Melkbos, but a clearer appreciation of the characteristics

TABLE 10

DIMENSIONS OF *SYNCERUS* SP. LOWER TEETH FROM MELKBOS, COMPARED WITH THOSE OF A *SYNCERUS CAFFER* SPECIMEN.

	P <sub>2</sub>		P <sub>3</sub>		P <sub>4</sub>		M <sub>1</sub>		M <sub>2</sub>		M <sub>3</sub>	
	l	b	l	b	l	b	l	bm	bd	l	bm	bd
Mb 608 .. ..	15.5	10.8	20.6	15.6	23.4	17.1	33.5	21.3	22.2	34.7	23.4	23.0
Mb 464 A .. ..	—	—	—	—	—	—	—	—	—	33.2	21.1	21.8
Mb 464 B .. ..	—	—	—	—	—	—	—	—	—	—	—	—
Mb 465 .. ..	—	—	18.4	13.9	22.1	c17.0	29.2	—	—	—	—	—
Mb 144 (1) .. ..	—	—	—	—	—	—	c35.0	20.0	21.1	39.9	19.7	20.1
Mb 4 (1) .. ..	—	—	—	—	—	—	—	—	—	34.7	—	—
Mb 604 .. ..	—	—	20.2	14.9	—	—	—	—	—	—	—	—
Mb 557 .. ..	—	—	c19.5	c14.3	—	—	—	—	—	—	—	—
M 147* .. ..	16.0	9.4	21.7	12.9	22.8	16.8	c24.8	16.3	18.4	30.0	19.2	20.3
										42.9	19.4	19.7

(1) Dimensions given are not true maxima since teeth incompletely erupted; on all other teeth maximum dimensions taken near base of crown.

\* Large ♂ *Syncerus caffer*.

and status of the Elandsfontein buffalo will enable a more objective analysis of the Melkbos material to be made.

It was considered that adequate grounds exist at present for assigning this material to the genus *Syncerus*. The size differences alone cannot justify an alternate conclusion, and while other critical differences may be revealed when more complete skulls are known, the available evidence suggests that the material belongs to what is merely an extremely robust buffalo of the *Syncerus* type.

#### Family **Bovidae**

##### Tribe *TRAGELAPHINI*

##### *Tragelaphus* cf. *strepsiceros* Pallas

The specimens tentatively assigned to this species are few in number, and almost all are poorly preserved. They are, however, of particular interest since they provide an additional record of an apparently extinct form of koodoo, which inhabited the south-western Cape in later Pleistocene times.

#### *Material*

*Mb 134*—The incomplete horn cores and frontlet of a large male, rather poorly preserved and reconstructed in part. The horn cores are robust, their diameter at the pedicle being comparable to those of the largest of the modern Greater Koodoo (*T. strepsiceros*) specimens available. Although only a part of their original length is preserved, it is evident that the helices had a considerably shorter pitch than those of the modern species. This feature is also apparent in the koodoo horn cores recovered at the Elandsfontein site.

*Mb 24*—The fragment of a left horn core, also with a tighter spiral than that of *T. strepsiceros*.

*Mb 388*—The fragment of a left frontal and horn core.

*Mb 135 A-E*—(table 11)—A series of left upper cheek teeth ( $P^3-M^3$ ), recovered in association with *Mb 134*, and belonging almost certainly to the same large male. Comparison with the upper cheek teeth of three male *T. strepsiceros* specimens revealed that morphologically the teeth are indistinguishable, but that they are significantly shorter, with the exception of the  $P^4$ . A similar disparity in tooth size is observed in the Elandsfontein koodoo material.

#### *Discussion*

The limited amount and condition of the material available precludes the possibility of establishing the specific status of the Melkbos koodoo. The differences from the extant *T. strepsiceros*, which it shares with material from the Elandsfontein site, strongly suggest that it belongs to a form at least sub-specifically distinct from the modern southern African koodoo. It clearly has greater affinities with this form than with the Lesser Koodoo (*T. imberbis*.)

A detailed study of the Elandsfontein material, which is more abundant and, in general, better preserved, should resolve the question of the classification of this fossil form.



TABLE 11  
DIMENSIONS OF MELKBOS *TRAGELAPHUS* CF. *STREPSICEROS* UPPER TEETH, COMPARED WITH  
A SERIES OF THOSE OF THREE MODERN KOOODOO.

					Mb 135	<i>Tragelaphus strepsiceros</i>	
						Mean	Range
P <sup>3</sup>	{ 1	...	...	...	14.8	17.5	16.9-18.0
	{ b	...	...	...	16.0	16.7	—
P <sup>4</sup>	{ 1	...	...	...	14.0	14.8	13.8-16.1
	{ b	...	...	...	16.3	17.6	16.9-18.7
M <sup>1</sup>	{ 1	...	...	...	18.4	21.7	20.0-22.7
	{ bm	...	...	...	20.2	20.6	19.1-22.4
	{ bd	...	...	...	19.9	20.3	19.2-21.7
M <sup>2</sup>	{ 1	...	...	...	23.4	26.5	25.9-26.9
	{ bm	...	...	...	23.1	23.3	22.0-24.8
	{ bd	...	...	...	21.7	22.4	21.7-23.3
M <sup>3</sup>	{ 1	...	...	...	25.0	28.7	28.0-30.1
	{ bm	...	...	...	21.7	22.8	22.0-23.5
	{ bd	...	...	...	17.8	21.1	20.8-21.3

### Family **Bovidae**

#### Tribe *TRAGELAPHINI*

#### *Taurotragus oryx* Pallas

#### Eland

The eland is poorly represented in the assemblage, and only four specimens, none of which show appreciable differences from the extant form, were assigned to this species.

*Mb 70*—(table 12)—The complete horn cores and frontlet of a large adult individual, and the best preserved of all the antelope cranial material recovered at the site.

TABLE 12  
DIMENSIONS OF MELKBOS *TAUROTRAGUS ORYX* HORN CORES AND FRONTLET.

									Mb 70
Skull width at horn pedicles	...	...	...	...	...	...	...	...	170.0
Base of right horn core	{	A/P diameter	...	...	...	...	...	...	77.0
		Transverse diameter	...	...	...	...	...	...	66.0
Distance between tips of horn cores	...	...	...	...	...	...	...	...	350.0
Maximum length of left horn core	...	...	...	...	...	...	...	...	510.0

*Mb 589*—A horn core fragment.

*Mb 11*—A mandible fragment with a single damaged molar.

*Mb 10*—A mandible fragment with incomplete M<sub>1</sub> and M<sub>2</sub>.

Family **Bovidae**Tribe *REDUNCINI**Redunca arundinum* Boddaert

## Reedbuck

The reedbuck is the most commonly represented antelope in the assemblage. Eighteen horn cores, mostly incomplete, were recovered, and these did not differ in any observable respect from those of the extant species (table 13). Also recovered were an incomplete M<sup>1</sup> or M<sup>2</sup>, and a fragment of mandible (Mb 215A & Mb 123).

TABLE 13

DIMENSIONS OF MELKBOS *REDUNCA ARUNDINUM* HORN CORES, COMPARED WITH THOSE OF A SERIES OF FOUR MODERN SPECIMENS.

	Melkbos specimens			Modern <i>R. arundinum</i>	
	Mean	Range	No. measured	Mean	Range
A/P diameter ... ..	33.4	28.0-38.0	6	35.1	31.9-38.0
Transverse diameter ...	33.8	30.0-38.7	13	34.3	32.2-36.6

This material may well have affinities with the reedbuck from the Swartklip sites (Hendey & Hendey, 1968), which, although on the basis of horn cores is indistinguishable from the modern species, appears to differ from it in other respects. However, at present there are no adequate grounds for separating the Melkbos reedbuck from *R. arundinum*.

Family **Bovidae**Tribe *HIPPOTRAGINI*cf. *Hippotragus* sp.

Two specimens in the assemblage were doubtfully ascribed to the genus *Hippotragus*.

*Mb 122*—A right dp<sub>4</sub> in an advanced state of wear, and which corresponds fairly closely in most respects to the dp<sub>4</sub> of a mandible from the Elandsfontein site (12209) that has been tentatively ascribed to *Hippotragus*.

*Mb 1*—(table 14)—An incomplete right mandible with the M<sub>2</sub> and M<sub>3</sub>, roots of the P<sub>4</sub> and M<sub>1</sub>, and alveoli of the P<sub>2</sub> and P<sub>3</sub>. The ascending ramus and the most anterior part of the corpus have been lost. In size the corpus and teeth are similar to those of a *Syncerus caffer* specimen (M 147, see tables 9 and 10), but the teeth are hippotragine rather than syncerine in character. The mesial enamel plication of the M<sub>2</sub> and M<sub>3</sub>, a characteristic of hippotragines but not present in *Syncerus*, does not extend through the entire crown height, and would have become less pronounced as wear on the teeth progressed and would have disappeared completely even when an appreciable amount of the crowns remained. In all the hippotragine comparative specimens examined, this accessory fold extended through the entire crown height.

TABLE 14  
DIMENSIONS OF MELKBOS CF. *HIPPOTRAGUS* SP. TEETH AND MANDIBLE.

	Mb 1	Mb 1
Height of corpus below M <sub>3</sub> ... ..	73·5	M <sub>2</sub> { 1 c32·4*
Width of corpus below M <sub>3</sub> ... ..	c33·3	{ bm 15·7 (20·8)‡
Height of corpus below M <sub>1</sub> ... ..	55·7	{ bd 15·6 (19·0)
Width of corpus below M <sub>1</sub> ... ..	34·0	M <sub>3</sub> { 1 c37·5
Height of corpus below P <sub>3</sub> ... ..	48·3	{ bm 14·5 (18·0)
Width of corpus below P <sub>3</sub> ... ..	25·9	{ bd 15·5 (17·8)
* Measurements at the occlusal surface.		P <sub>2</sub> -M <sub>3</sub>
‡ Maximum dimensions near base of crown.		alveolar 1 161·7

A giant hippotragine is known from the Pleistocene of Africa (*Hippotragus gigas* Leakey, 1965), and this species is thought to be present in the Elandsfontein assemblage. It is possible that the specimen Mb 1 has affinities with this form.

Family **Bovidae**  
Tribe *ALCELAPHINI*  
cf. *Connochaetes* sp.

A total of six horn core fragments and seven teeth from the assemblage were tentatively assigned to the genus *Connochaetes* (*sensu lato*). Attempts to place this material specifically were inconclusive.

Family **Bovidae**  
Tribe *NEOTRAGINI*  
*Raphicerus* sp.

The neotragine group of antelopes is represented in the assemblage by a single poorly preserved horn core (Mb 29). It is indistinguishable in all observable respects from the horn cores of the extant species, *R. campestris* and *R. melanotis*, both of which occur in the south-western Cape today.

Family **Bovidae**  
Tribe *ANTILOPINI*  
cf. *Antidorcas* sp.

A pair of incomplete horn cores (Mb 177 E and F) were doubtfully ascribed to the genus *Antidorcas*. Little of the right horn core is preserved and observations were confined to that from the left (Mb 177E).

The antero-posterior axis of the horn core is at an angle to the median line of the skull, the orientation in this respect being as in *A. marsupialis*. In the vertical sense its angulation begins as in *A. marsupialis*, but unlike this species it does not curve posteriorly, remaining instead remarkably straight along its entire

length. In this respect it corresponds more closely to the form of the horn cores of *A. marsupialis australis* from Swartklip (Hendey & Hendey, 1968).

It also corresponds closely in size to the horn cores of the males of the Swartklip subspecies, having an anteroposterior diameter of 27.5 mm and a transverse diameter of 24.0 mm at the pedicle. The transverse compression of the core expressed as a percentage (Gentry, 1964) is 87.3, which is within the range of variation encountered in the modern *A. marsupialis*. In vertical section the inter-frontal plane is almost identical to that of the Swartklip specimen ZW 67a.

Only the marked straightness of this specimen is not in keeping with the horn cores of *Antidorcas*, and it is possibly a feature of an isolated aberrant individual, but until other specimens are recovered, the tentative diagnosis must stand.

#### Family **Bovidae**

##### *Incertae sedis*

In addition to the material already described, sixteen incomplete teeth, two incomplete mandibles and two horn core fragments were recovered. None of these specimens suggest the presence of a form other than those already listed.

No attempt was made to classify the large number of bovid postcranial bones recovered at the site.

#### Family **Bathergidae**

##### *Bathergus suillus* Schreber

##### Cape Dune Mole

An almost complete skeleton (Mb 173) and an isolated lower incisor (Mb 49) of *Bathergus* were recovered at the site. Although the condition of these specimens resembled that of the other fossils, it is possible that they are recent intrusive elements in the assemblage. The dune mole is common in the area today, and skeletons, or parts thereof, of recently dead individuals have been recovered at the site. It is possible that such remains which become buried may take on the appearance of the other fossils simply by becoming discoloured.

Intrusive elements at surface sites such as Melkbos can often not be detected without resort to chemical analyses, and since none were carried out in conjunction with the present survey, the status of these questionable elements in the assemblage remains uncertain.

#### Class **REPTILIA**

#### Order **CHELONIA**

##### *Incertae sedis*

Fifty fragments of carapace, probably all belonging to land tortoises, were included in the assemblage, but no attempt was made to classify them.



Class *AVES*Family **Struthionidae***Struthio australis*

## Ostrich

The ostrich is represented in the assemblage by two first phalanges (Mb 496 A & B), which are indistinguishable in all observable respects from those of the extant species.

## DISCUSSION OF THE FAUNA

There are a number of sites in the south-western Cape Province which have yielded mammalian fossils, and while the study of the fauna of these sites is still in progress, it is apparent that in time they span the greater part of the Quaternary. Most attention has been focused upon the fossil occurrences at Langebaanweg, Elandsfontein (Hopefield), Melkbos and Swartklip, and the fauna of these sites is now moderately well known (table 15).

The Langebaanweg sites are both the earliest and potentially the most important of them all. They date probably from 'the earliest phases of the Pleistocene' (Boné & Singer, 1965), and have yielded a number of archaic forms, such as *Hipparion*, *Anancus*, *Stegolophodon*, an agriotheriine bear and a nimravine. The fossils have been recovered in the course of the mining of phosphate by the African Metals Corporation (Singer, 1961), and most of the material recorded to date has come from three quarries, viz. Baard's, 'E' and 'C' Quarries. The deposits in Baard's Quarry are apparently largely fluvial, those in 'E' Quarry are estuarine and in 'C' Quarry there is a mixture of marine and estuarine sediments. The mammalian faunas from the three quarries are apparently at least broadly contemporary. The fossils have no known archaeological associations.

The fauna of the Elandsfontein site is the best known in the region (cf. Singer, 1962 for references), and the geology and archaeology of the site have recently been the subject of intensive study (H. J. Deacon and J. Wymer, in preparation). The fauna includes a number of extinct genera and species, but modern forms, or forms only subspecifically distinct from them, are well represented. The date usually used in reference to the fauna of this site is late Middle / early Upper Pleistocene (Boné & Singer, 1965), but it is possible that later elements occur in accidental association with the main body of fossils (Inskeep & Hendey, 1966). Artefacts of three industrial complexes have been recovered at the site, with the main faunal element apparently associated with an evolved Acheulian ('Fauresmith') industry (Howell & Clark, 1963; J. Wymer, pers. comm.).

The sites at Swartklip, which are late Pleistocene or Recent in age, have yielded a fauna made up almost entirely of modern forms (Hendey & Hendey, 1968). These sites have no certain cultural associations, but tenuous links with the Late Stone Age and historic times (Post-1652 A.D.) have been suggested.

TABLE 15

THE FAUNA OF THE PRINCIPAL FOSSIL SITES OF THE SOUTH-WESTERN CAPE PROVINCE.

	Langebaan- weg			Elandsfontein (Hopefield)	Melkbos	Swartklip
	Baard's Quarry	'C' Quarry	'E' Quarry			
Class <i>MAMMALIA</i>						
Order ARTIODACTYLA						
Family <b>Hominidae</b>						
<i>*Homo sapiens rhodesiensis</i> .. .. .				×		
Family <b>Cercopithecidae</b>						
<i>*Simopithecus oswaldi hopefieldensis</i> .. .. .				×		
Order PHOLIDOTA						
<i>Manis</i> sp. .. .. .				×		
Order CARNIVORA						
Family <b>Mustelidae</b>						
<i>Mellivora capensis</i> .. .. .				×		×
<i>*Aonyx</i> sp. .. .. .						×
Family <b>Canidae</b>						
Subfamily Caninae						
<i>Canis mesomelas</i> .. .. .				×	cf.	cf.
<i>Canis adustus</i> .. .. .				×		
<i>*Canis</i> sp. .. .. .				cf.		cf.
<i>*Canis</i> sp. .. .. .			×			
Subfamily Simocyoninae						
<i>*Lycan pictus magnus</i> .. .. .				×		
<i>Lycan pictus</i> .. .. .						×
Family <b>Ursidae</b>						
Subfamily Agriotheriinae						
<i>*cf. Agriotherium</i> sp. .. .. .			×			
Family <b>Viverridae</b>						
<i>Herpestes ichneumon</i> .. .. .				×		×
Family <b>Felidae</b>						
Subfamily Felinae						
<i>Felis serval</i> .. .. .				×		cf.
<i>Felis caracal</i> .. .. .				×		
<i>*Felis</i> sp. .. .. .			×			
<i>Felis leo</i> .. .. .						×
<i>*Felis leo aff. spelaea</i> .. .. .				×	×	
Subfamily Machaerodontinae						
<i>*Megantereon cf. gracile</i> .. .. .				×		
Subfamily Nimravinae						
<i>*Dinofelis</i> sp. .. .. .			×			
Family <b>Hyaenidae</b>						
<i>Hyaena brunnea</i> .. .. .				×	cf.	×
<i>*Hyaena</i> sp. .. .. .		×	×			
<i>*Crocuta crocuta spelaea</i> .. .. .				×		
Order PINNIPEDIA						
Family <b>Otariidae</b>						
? <i>Arctocephalus pusillus</i> .. .. .					×	
<i>*cf. Arctocephalus</i> sp. .. .. .	×	×	×			

Table 15 — cont.

	Langebaan- weg			Elandsfontein (Hopefield)	Melkbos	Swartklip
	Baard's Quarry	'C' Quarry	'E' Quarry			
Order PROBOSCIDEA						
Family Gomphotheriidae						
* <i>Anancus</i> sp. . . . .			×			
Family Elephantidae						
* <i>Stegolophodon</i> sp. . . . .	×					
* <i>Stegodon</i> sp. . . . .	○	○				
*cf. ' <i>Archidiskodon</i> ' sp. . . . .	○	○				
*' <i>Archidiskodon</i> ' <i>broomi</i> . . . . .				×		
*' <i>Loxodonta</i> ' <i>zulu</i> . . . . .				×		
? <i>Loxodonta africana</i> . . . . .					×	
Order PERISSODACTYLA						
Family Rhinocerotidae						
<i>Diceros bicornis</i> . . . . .	×		×	×	×	
<i>Diceros simus</i> . . . . .	×			×	×	×
*? <i>Diceros</i> sp. . . . .	×					
Family Equidae						
* <i>Hipparion albertense baardi</i> . . . . .	×	×	cf.			
* <i>Equus plicatus</i> . . . . .				×		
* <i>Equus helmei</i> . . . . .	○	○		×		
<i>Equus</i> sp. . . . .					×	×
Order ARTIODACTYLA						
Family Suidae						
* <i>Mesoschoerus lategani</i> . . . . .				×		
* <i>Mesoschoerus paiceae</i> . . . . .				×		
* <i>Tapinochoerus meadowsi</i> . . . . .				×		
* <i>Incertae sedis</i> (2) . . . . .			×			
Family Hippopotamidae						
<i>Hippopotamus amphibius</i> . . . . .	cf.	cf.		×	×	cf.
Family Giraffidae						
* <i>Libytherium olduvaiense</i> . . . . .	×		×	×		
* <i>Giraffa gracilis</i> . . . . .			cf.	cf.		
Family Bovidae						
* <i>Tragelaphus</i> cf. <i>strepsiceros</i> . . . . .				×	×	
<i>Taurotragus oryx</i> . . . . .				×	×	
*' <i>Homoioceras bainii</i> ' . . . . .				×		
* <i>Syncerus</i> sp. . . . .					×	
<i>Redunca arundinum</i> . . . . .				×	×	
<i>Redunca</i> cf. <i>arundinum</i> . . . . .						×
* <i>Redunca</i> sp. . . . .	○	○	×			
* <i>Hippotragus</i> cf. <i>leucophaeus</i> . . . . .						×
* <i>Hippotragus</i> spp. . . . .			cf.	×	×	
* <i>Damaliscus</i> sp. . . . .	○	○				
* <i>Damaliscus</i> sp. . . . .				×		
cf. <i>Connocchaetes</i> sp. . . . .				×	×	×
* <i>Lunatoceros</i> cf. <i>mirum</i> . . . . .				×		
* <i>Megalotragus</i> sp. . . . .				×		
cf. <i>Oreotragus</i> sp. . . . .	○	○				
<i>Raphicerus</i> sp. . . . .				×	×	×

Table 15 — *cont.*

	Langebaan- weg			Elandsfontein (Hopefield)	Melkbos	Swartklip
	Baard's Quarry	'C' Quarry	'E' Quarry			
Family <b>Bovidae</b> ( <i>cont.</i> )						
* <i>Antidorcas marsupialis australis</i> ... ..						×
* <i>Antidorcas</i> sp. ... ..				×	cf.	
* <i>Gazella</i> cf. <i>wellsi</i> ... ..				×		
* <i>Gazella</i> spp. ... ..	×		×	×		
* <i>Incertae sedis</i> (+1) ... ..			×	×		
Order <b>CETACEA</b>						
<i>Incertae sedis</i> .. ..			×			
Order <b>LAGOMORPHA</b>						
<i>Lepus capensis</i> .. ..				×		
<i>Lepus</i> sp. ... ..			×			
Order <b>RODENTIA</b>						
Family <b>Bathyergidae</b>						
<i>Bathyergus suillus</i> .. ..				×	×	×
<i>Georychus</i> cf. <i>capensis</i> .. ..				×		
Family <b>Hystricidae</b>						
<i>Hystrix</i> cf. <i>africae-australis</i> .. ..				×		
Family <b>Muridae</b>						
<i>Otomys</i> cf. <i>saundersiae</i> .. ..				×		
<i>Parotomys</i> cf. <i>brantsi</i> .. ..				×		
<i>Incertae sedis</i> (+1) .. ..			×			×
Class <b>REPTILIA</b>						
Order <b>CHELONIA</b>						
<i>Incertae sedis</i> (+1) .. ..	×	×	×	×	×	×
Class <b>AVES</b>						
Order <b>STRUTHIONIFORMES</b>						
<i>Struthio australis</i> ... ..			×	×	×	×
<i>Incertae sedis</i> (+1) ... ..			×	×		
Class <b>CHONDRICHTHYES</b>						
Several genera and species		×				
Class <b>OSTEICHTHYES</b>						
Several genera and species		×	×			

\* Extinct forms.

○ Recorded from 'Langebaanweg'; from either Baard's Quarry, 'C' Quarry or both.

The Melkbos fauna has essentially the same 'modern' character as that from Swartklip, but it includes elements such as the lion, hyaena and koodoo, which have affinities to forms from Elandsfontein. In addition, the buffalo and ? hippotragine antelope from Melkbos are extinct forms not represented in the Swartklip assemblage, and it is concluded that the Melkbos fauna predates that from Swartklip. The archaeological associations of these two sites, while too dubious to be of real value, do at least suggest an age difference in the right



order. Since none of the extinct genera of the Elandsfontein fauna (*Simopithecus*, *Mesochœrus*, *Megantereon*, etc.) occur at Melkbos, the fauna of the latter site almost certainly post-dates the main Elandsfontein fauna.

These four sites have yielded widely different numbers of specimens, ranging between about 600 from Melkbos to about 20,000 from Elandsfontein, and they have been studied with varying degrees of thoroughness. Nevertheless, it is concluded that there are sufficient grounds for considering Melkbos to be intermediate in age between Elandsfontein and Swartklip, and that these three occurrences date from the latter part of the Quaternary. The Langebaanweg fauna takes a more isolated position in the earlier part of the Pleistocene.

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#### SUMMARY

The location, geological and archaeological associations, and fauna of a fossil site north of the town of Melkbosstrand, Cape Province is discussed. The remains of eighteen types of mammals, one bird and one tortoise are described or mentioned. It is concluded that the site dates from the latter part of the Upper Pleistocene, that it post-dates that at Elandsfontein (Hopefield), and is earlier than the Swartklip fossil sites.

#### REFERENCES

- BATE, D. M. A. 1949. A new African fossil long-horned buffalo. *Ann. Mag. nat. Hist.* (12) 2: 396-398.  
BATE, D. M. A. 1951. The Pleistocene fauna of two Blue Nile sites. The mammals from Singa and Abu Hugar. *Fossil Mammals Afr.* 2: 1-28.

- BONÉ, E. L. & SINGER, R. 1965. *Hipparion* from Langebaanweg, Cape Province and a revision of the genus in Africa. *Ann. S. Afr. Mus.* **48**: 273-397.
- BROOM, R. 1909. On the evidence of a large horse recently extinct in South Africa. *Ann. S. Afr. Mus.* **7**: 281-282.
- BROOM, R. 1939. A preliminary account of the Pleistocene carnivores of the Transvaal caves. *Ann. Transv. Mus.* **19**: 331-338.
- BROOM, R. 1948. Some South African Pliocene and Pleistocene mammals. *Ann. Transv. Mus.* **21**: 1-38.
- COOKE, H. B. S. 1950. A critical revision of the Quaternary Perissodactyla of southern Africa. *Ann. S. Afr. Mus.* **31**: 393-479.
- COOKE, H. B. S. 1955. Some fossil mammals in the South African Museum collections. *Ann. S. Afr. Mus.* **42**: 161-168.
- DAWKINS, W. B. & SANFORD, W. A. 1866-1872. A monograph of the British Pleistocene Mammalia. 1. British Pleistocene Felidae. *Palaeontogr. Soc. [Monogr.]* [**1866-72**]: 1-194.
- DEACON, J. 1966. An annotated list of the radiocarbon dates for sub-Saharan Africa. *Ann. Cape prov. Mus.* **5**: 5-84.
- DREYER, T. F. & LYLE, A. 1931. *New fossil mammals and man from South Africa*. Bloemfontein: Nasionale Pers.
- DU TOIT, A. L. 1917. Report on the phosphates of Saldanha Bay. *Mem. geol. Surv. S. Afr.* **10**: 1-38.
- ELLERMAN, J. R., MORRISON-SCOTT, T. C. S. & HAYMAN, R. W. 1953. *Southern African mammals, 1758-1951; a reclassification*. London: British Museum (Natural History).
- EMILIANI, C. 1961. Cenozoic climatic changes as indicated by the stratigraphy and chronology of deep-sea cores of globigerina-ooze facies. *Ann. N. Y. Acad. Sci.* **95**: 521-536.
- EWER, R. F. 1954. Some adaptive features in the dentition of hyaenas. *Ann. Mag. nat. Hist.* (12) **7**: 188-194.
- EWER, R. F. 1956a. The fossil carnivores of the Transvaal caves. Felinae. *Proc. zool. Soc. Lond.* **126**: 83-95.
- EWER, R. F. 1956b. The fossil carnivores of the Transvaal caves. Canidae. *Proc. zool. Soc. Lond.* **126**: 97-119.
- EWER, R. F. & SINGER, R. 1956. Fossil Carnivora from Hopefield. *Ann. S. Afr. Mus.* **42**: 335-347.
- GENTRY, A. W. 1964. Skull characters of African gazelles. *Ann. Mag. nat. Hist.* (13) **7**: 353-382.
- HENDEY, Q. B. 1967. A specimen of 'Archidiskodon' cf. *transvaalensis* from the south-western Cape Province. *S. Afr. archaeol. Bull.* **22**: 53-56.
- HENDEY, Q. B. & HENDEY, H. 1968. New Quaternary fossil sites near Swartklip, Cape Province. *Ann. S. Afr. Mus.* **52**: 43-73.
- HOOIJER, D. A. 1947. Pleistocene remains of *Panthera tigris* (Linnaeus) subspecies from Wanhsien, Szechwan, China, compared with fossil and recent tigers from other localities. *Am. Mus. Novit.* **1346**: 1-17.
- HOWELL, F. C. & CLARK, J. D. 1963. Acheulian hunter-gatherers of sub-Saharan Africa. *Publs. Anthropol. Viking Fund* **36**: 458-533. (HOWELL, F. C. & BOURLIÈRE, F. eds. *African ecology and human evolution*.)
- INSKEEP, R. R. & HENDEY, Q. B. 1966. An interesting association of bones from the Elandsfontein fossil site. *Actas del 5 Congreso Panafricano de Prehistoria y de Estudio del Cuaternario*, Santa Cruz de Tenerife, 1963, **2**: 109-123. (*Publins Mus. arqueol., Tenerife* **6**: 109-123.)
- KRIGE, A. V. 1927. An examination of the Tertiary and Quaternary changes of sea-level in South Africa. *Annale Univ. Stellenbosch* (A) **5**: 1-81.
- KURTÉN, B. 1965a. The Pleistocene Felidae of Florida. *Biol. Sci. Bull. Fla. St. Mus.* **9**: 216-273.
- KURTÉN, B. 1965b. The Carnivora of the Palestine caves. *Acta zool. fenn.* **107**: 1-74.
- LEAKEY, L. S. B. 1965 *Olduvai Gorge 1951-1961* 1. Cambridge: University Press.
- MABBUTT, J. A., RUDNER, J. & SINGER, R. 1955. Geomorphology, archaeology and anthropology from Bok Baai, Darling district, Cape Province. *S. Afr. archaeol. Bull.* **10**: 85-93.
- MERRIAM, J. C. & STOCK, C. 1932. The Felidae of Rancho La Brea. *Publs. Carnegie Instn* **422**: 1-231.

- OAKLEY, K. P. 1964. *Frameworks for dating fossil man*. London: Weidenfeld & Nicholson.
- ROBERTS, A. 1951. *The mammals of South Africa*. Johannesburg: C.N.A.
- SEELEY, H. G. 1891. On *Bubalus bainii* (Seeley). *Geol. Mag.* (3) **8**: 199-202.
- SIMPSON, G. G. 1941. Large Pleistocene felines of North America. *Am. Mus. Novit.* **1136**: 1-27.
- SINGER, R. 1961. The new fossil sites at Langebaanweg, South Africa. *Curr. Anthropol.* **2**: 385-387.
- SINGER, R. 1962. *Simopithecus* from Hopefield, South Africa. *Biblthca primat.* **1**: 43-70.
- SINGER, R. & FULLER, A. O. 1962. The geology and description of a fossiliferous deposit near Zwartklip in False Bay. *Trans. R. Soc. S. Afr.* **36**: 205-211.
- TALBOT, W. J. 1947. *Swartland and Sandveld*. Cape Town: Oxford University Press.
- TODD, N. B. 1966. Metrical and non-metrical variation in the skulls of Gir Lions. *J. Bombay nat. Hist. Soc.* **62**: 507-520.
- ZEUNER, F. E. 1959. *The Pleistocene period*. London: Hutchinson.